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Original Article

The effects of a self-care program on patients with heart failure

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Abstract

Background: A lack of adequate knowledge and misconceptions by heart failure (HF) patients can lead to the improper use of self-care skills, as well as a lack of confidence in those same self-care skills. The existing literature suggests that care providers using a video-tape or a teaching booklet to educate HF patients, combined with telephone or telemonitoring counseling can effectively promote self-care and reduce readmission rates, and in turn promote overall patient health. The aim of the present study was to investigate the effects of self-care programs in patients with HF.

Methods: A quasi-experimental design was used to investigate the effectiveness of a self-care program in HF patients. The patients were allocated into either the control group (usual care, $n = 75$) or the experimental group (self-care program, $n = 56$). The extent of patient knowledge about congestive HF (CHF) was tested at both the pre- and posteducation stages. We measured the self-care of HF index (SCHFI) and the New York Heart Association (NYHA) functional class a total of four times for each participant. Furthermore, hospital readmissions and mortality rates were also collected.

Results: The experimental group showed a significantly higher mean score in the knowledge of CHF during posteducation testing than the control group. The results of the self-care evaluation also revealed significant differences between the two groups by repeated general linear model measurement analysis. Self-care maintenance, self-care management, and self-care confidence significantly improved after the self-care program was completed. The NYHA functional class in the experimental group showed a significant improvement after hospital discharge when compared with those in the control group. However there was no significant difference in hospital readmission or mortality rate between the two groups.

Conclusion: Our study reveals that self-care programs administered by HF patients can reinforce educational objectives and improve patient ability to effectively perform self-care.

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Keywords: heart failure; self-care of heart failure index; self-care program

1. Introduction

Heart failure (HF) is traditionally the final stage of heart disease. The clinical symptoms of HF include weakness, fatigue, oliguria, memory loss, anxiety, headaches, insomnia, exertional dyspnea, orthopnea, and edema.¹ To date, it has been observed that the treatment of HF with drugs can reduce

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mortality and morbidity. Furthermore, effective implementation of lifestyle changes can decrease the incidence of HF symptoms and delay disease progression.² However, inadequate knowledge and patient misconception can lead to improperly administered self-care skills by HF patients, coupled with a lack of self-confidence in the capacity to perform those skills. When lifestyle changes and diet control are poorly implemented, the result is often repeated hospitalization.² An earlier study determined that two-thirds of HF patient readmissions were preventable. Additionally, on-time medication and timely detection of worsening symptoms were able to reduce the rate of readmission.³ Therefore, appropriate self-care interventions for patients, in addition to the enhancement of patient self-care, can reduce readmission rates.

Self-care is defined as an individual's capacity to perform health promotion, disease prevention or maintenance, and even the possibility of a change in the sense of well-being to address particular behaviors.⁴ Self-care includes maintenance of self-care and self-care management.⁵ Self-care maintenance of HF patients means individuals undertake to maintain healthy behaviors such as: limitation or cessation of smoking, limiting alcohol intake, compliance with medication and low-salt diet, limiting water intake, daily weighing, regular exercise and early detection of worsening symptoms, and regular and timely vaccination.⁶ Logically, self-care management of HF patients then builds on the recognition, monitoring, and treatment of this self-care maintenance.⁵ Although an earlier study has shown that 20–46% of HF patients display poor compliance behavior,⁷ self-care interventions can improve a HF patient's self-care maintenance and management.⁸ When HF patients have confidence in their abilities to control symptoms and adhere to treatment regimens, this is thought to mediate the relationship with improved self-care outcomes.⁹ Several studies have revealed that self-care confidence is associated with better self-care maintenance or self-care management.^{10–12} Thus, self-care is positively influenced by a patient's confidence in their own abilities.¹³

Many studies have demonstrated that patients with HF who received a self-care intervention showed significantly better outcomes than those who did not.^{8,14–16} Self-care intervention is viewed as being inclusive of both maintenance and management behavior components.^{8,15–17} Several studies suggest that comprehensive discharge planning, including patient's education, collaboration with visiting nurses or a combination of telephone and telemonitoring counseling can effectively promote self-care, reduce readmission rates, and promote health.^{18–20} However, in our hospital, there is no formal self-care intervention protocol or regimen for HF patients, and information provided to HF patients is limited. Currently, we have developed a HF patient self-care program consisting of a teaching booklet and video-tape. However, there needs to be an established test for the effectiveness of such programs to ensure their suitability for use. The aim of the present study was to assess the effectiveness of a self-care program for HF patients and how such a program impacts the level of knowledge about congestive HF (CHF); and to then evaluate changes in self-care when compared with the usual practice.

Our hypothesis is that if patients with HF are provided with an educational intervention and supplemented with regular telephone counseling with nurses, this may enhance the growth of their knowledge and self-care and thus promote improved health outcomes.

2. Methods

2.1. Design

Participants were allocated into either the control group or the experimental group by convenience sampling. A quasi-experimental design was used to investigate the effectiveness of a self-care program in HF patients. A two-group pre- and post-test design was implemented.

2.2. Ethics considerations

This prospective study was approved by the Institutional Ethics Board of Taipei Veterans General Hospital, Taipei, Taiwan. Patients who enrolled into the study were asked to give written informed consent.

2.3. Participants

The inclusion criteria for study participants were that patients had to be conscious, older than 30 years, able to communicate, listen, speak, read, and write. Patients had been diagnosed with CHF (systolic or diastolic dysfunction) and chest X-ray showed pulmonary edema or left ventricular ejection fraction < 40%, and New York Heart Association (NYHA) functional Class I–III. A total of 131 patients were recruited. The control group (usual care, $n = 75$) was enrolled before recruitment of the experimental group (self-care program, $n = 56$). Loss at follow-up included seven patients and 11 patients in the control and experimental groups, respectively, due to time inconvenience.

2.4. Measurements

The study questionnaire included demographic characteristics, knowledge of the CHF questionnaire and the self-care of HF index (SCHFI). Questionnaires that were originally written in English were translated into Mandarin, and then the English version was reviewed with the original scale by bilingual experts to confirm no translation discrepancy occurred.

2.5. Demographic characteristics

The form used to collect demographic characteristics was designed by researchers through referral to relevant literature, including questions regarding demographic characteristics of the patients such as sex, age, left ventricular ejection fraction (LVEF; %), NYHA functional class, and medical status such as current diagnoses, comorbidities, hospital readmissions, and mortality rate.

2.6. Knowledge of the CHF questionnaire

We assessed a change in HF knowledge using a knowledge score associated with the CHF questionnaire.²¹ The questionnaire included a 15 question scale administered verbally to patients or written by patients. Questions such as multiple choice and true/false responses were used. A higher score indicated a higher level of disease knowledge.

2.7. Self-care of HF index

The SCHFI version 6.2¹³ consists of three subscales (22 items) of self-care: self-care maintenance, self-care management, and self-care confidence. Self-care maintenance includes 10 items, where each item was rated on an ordinal scale, ranging from 1 to 4, with 1 corresponding to never or rare adherence to self-care maintenance, and 4 corresponding to consistent adherence to self-care maintenance. Overall, the global score of self-care maintenance ranges from 10 to 40. Self-care management consists of six items of symptom recognition, treatment implementation, and treatment evaluation. The highest and lowest raw score obtained was 24 and 4, respectively. Self-care confidence consists of six items, with a highest and lowest score of 24 and 6, respectively. The reliability and validity of this instrument were both confirmed in previous research and its developer recommends scoring three subscales individually (scores range from 0 to 100) instead of determining a total summary score.¹³ Higher scores indicate superior patient self-care and adequate self-care is designated by a score of > 70 on any subscale. In the present study, Cronbach α = 0.87 for self-care maintenance, Cronbach α = 0.86 for self-care management, and Cronbach α = 0.90 for self-care confidence.

2.8. Self-care program

In the present study, the self-care program was developed by a panel of experts based on the Riegel Self-Care Heart Failure Model.^{9,13} First, we followed the clinical practice guidelines for HF patients,²² multidisciplinary HF programs and experience of our research teams to develop a teaching booklet and video-tape (in both Mandarin and Taiwanese).^{5–8} The materials were created using simple language at a primary school reading level, and each item had associated graphics to reinforce understanding. The face validity of educational materials was determined after a review provided by 12 experts (cardiologists, dieticians, cardiology nurses, and physiotherapists) with a content validity index value of 0.92. Second, four care providers trained in interview techniques participated in the creation of all teaching instruction and all questionnaires, both during the validation process and with study participants, to maintain consistency in responses. Each participant in the experimental group received one day-long individual self-care training session within 1 week of admission. The session included: recognition of HF, adherence to prescription medication, dietary guidance, compliance with low-salt diet, limiting water intake, low-fat diet, exercise

guidelines, enforcement of lifestyle changes, as well as assessment and management of symptoms. Subsequent to completing the self-care teaching session, patients received a teaching booklet and self-care video-tape, and a daily log (for recorded blood pressure, heart rate, diet, exercise, and symptoms). Care providers thereafter carried out follow-up telephone calls at intervals of 1 week, 1 month, and 3 months after hospital discharge to obtain feedback from participants regarding their adherence to overall self-care, and monitor any patient change in self-care maintenance, management, and confidence.

2.9. Usual care

Participants in the control group received the usual care which would customarily be administered to HF patients receiving treatment from our facility, including a focus on the symptoms of HF and suggested patient adherence to treatment.

2.10. Data collection and outcome measures

The primary outcome was knowledge of CHF at both the pre- and posteducation intervals. SCHFI and NYHA functional class were measured before education was provided (T0), at 1 week (T1), at 1 month (T2), and 3 months after hospital discharge (T3). Secondary outcome measures included hospital readmissions and mortality rate.

2.11. Statistical analysis

Data are presented as means \pm standard deviation (SD) or as n (%) as appropriate. Statistical analysis was performed using SPSS software (version 17.0 for Windows; SPSS Inc., Chicago, IL, USA). The differences between the control and experimental groups on the demographic outcome data were analyzed by independent t test or χ^2 test. The paired t test was used to compare differential knowledge about the CHF questionnaire, within groups, regarding nursing instruction. The Mann–Whitney U test was used to compare differences between the two groups. Logistic regression was used to examine the relationships of outcome factors with the selected characteristics between the two groups. Additionally, the general linear model (GLM) was applied, and repeated measurements were used to analyze the time series design to test for differences between and within patients as appropriate. A p value < 0.05 was considered to be statistically significant.

3. Results

The mean patient age in our study was 62.7 ± 15.3 years and 62.9 ± 13.7 years in the control and experimental groups, respectively. There was no significant difference between the two groups. Clinical and demographic characteristics are presented in Table 1. There were more female patients in the experimental group than in the control group. There were no significant differences in the LVEF, medication at the time of admission, NYHA functional Class I at admission,

Table 1
Demographics and clinical characteristics of participants.

Characteristics	Control (n = 75)	Experimental (n = 56)	*p
Age (y)	62.7 ± 15.3	62.9 ± 13.7	0.48
LVEF (%)	41.8 ± 16.0	42.0 ± 13.8	0.46
Male	58 (77.3)*	31 (55.4)	0.008
NYHA classification			0.15
at admission			
Class I	12 (16.0)	2 (3.6)	
Class II	30 (40.0)	24 (42.9)	
Class III	33 (44.0)	30 (53.6)	
Class IV	0	0	
Medication at admission			0.75
ACEI/ARB	6 (8.0)	4 (7.1)	
B-blocker	13 (17.3)	14 (25.0)	
ACEI/ARB+B-blocker	10 (13.3)	6 (10.7)	
Others	46 (61.3)	32 (57.1)	
Comorbidities			0.58
Yes	53 (70.7)	42 (75.0)	
No	22 (29.3)	14 (25)	
30-day readmission			0.31
Yes	9 (12)	7 (12.5)	
No	66 (88)	49 (87.5)	
90-day readmission			0.31
Yes	19 (25.3)	9 (16.1)	
No	56 (74.7)	47 (83.9)	
30-day mortality			0.47
Yes	0 (0)	0 (0)	
90-day mortality			0.74
Yes	2 (2.7)	1 (1.8)	
No	73 (97.3)	55 (98.2)	

Data are presented as n (%), or mean ± SD.

* $p < 0.05$; comparison of the difference between the control group and the experimental group.

ACEI = angiotensin-converting-enzyme inhibitor; ARB = angiotensin receptor blocker; LVEF = left ventricular ejection fraction; NYHA = New York Heart Association Classification.

comorbidity, and the mortality rate between the two groups. Overall, 30-day hospital readmission was 12.2 % in this HF population (12.0% vs. 12.5% in the control group and experimental group, respectively; $p > 0.05$). Patients in the experimental group had a lower tendency to need hospitalization at the 3 month hospital readmission interval than patients in the control group, although there was no significant difference between the two groups (16.1% vs. 25.3%, respectively; $p > 0.05$). The logistic regression analysis has been adjusted to accommodate sex and NYHA functional class at admission for rates of 30-day hospital readmission, 3 months hospital readmission, and 3 months mortality rate. There were no significant differences between the two groups. After multiple regression analysis, eight variables were unable to explain the variance in the total score of self-care management behaviors with any significance ($F = 0.349$, adjusted $R^2 = -0.002$, $p = 0.24$).

Both groups showed a significant increase in HF related knowledge from pre- to posteducation. The experimental group showed a greater improvement in HF related knowledge posteducation when compared to the control group (Table 2). The results of the series of four measurements of self-care showed significant differences between the two groups by GLM analysis (Table 3). The mean of the experimental group

Table 2
Comparison of knowledge of congestive heart failure.

	Control (n = 75)	Experimental (n = 56)
Pretest	50.8 ± 22.1	58.3 ± 19.8
Post-test	70.8 ± 17.4*	75.8 ± 16.8*††

Data are presented as mean ± SD.

* $p < 0.001$, comparison of the difference within groups.

† $p < 0.05$, comparison of the difference between the control group and the experimental group.

was higher than that of the control group. Self-care maintenance, self-care management, and self-care confidence had interactive effects of both variables and group, indicating that self-care program effects had a significantly positive impact on the experimental group. Scores on the self-care maintenance subscales remained < 70 during the 3 months after hospital discharge. The data indicate inadequate self-care maintenance. The lowest score for self-care maintenance was related to forgetting to take medicine and a low-salt diet. The effects of self-care maintenance and self-care management were significant within the series of four measurements for the experimental group, but not for the control group (Fig. 1A and 1B). However, the effects on self-care confidence were the most apparent. The self-care program was capable of increasing patient's confidence of self-care, and these changes were sustained for 3 months (Fig. 1C). Table 4 shows the three subgroups of self-care management of the series of four measurements between the two groups by GLM analysis. Treatment implementation had interactive effects of variables and group, indicating that self-care program effects had a significantly positive impact on the experimental group. The effects of treatment implementation were significant within the series of four measurements for the experimental group, but not for the control group (Fig. 2B). Symptom recognition and treatment evaluation showed no difference between the two groups, but showed significant differences among the series of four measurements. These findings revealed that patients from both groups had improved symptom recognition and treatment evaluation (Fig. 2A and 2C). The self-care program had a significant effect on the self-care behaviors for 3 months, especially in self-care maintenance, self-care management, and self-care confidence. The NYHA functional class was significantly improved in the experimental group when compared to the control group after discharge (Table 5).

4. Discussion

Within the HF population, coordination and supportive assistance for self-care with education are key recommendations made by medical providers.⁸ Furthermore, improvement of the hospital to home transition for HF patients is a logical step in responding to current practice guidelines.^{23,24} Our study has demonstrated that timely education utilizing well-designed teaching with a teaching booklet and video-tape can enable care providers to deliver evidence-based education and counseling. In the present study, both the experimental and control groups displayed a significant increase in

Table 3
General linear model of repeat measure of outcomes of self-care.

	T0	T1	T2	T3	Between F	Within F	Interaction (variable × group)	Post comparison
Self-care maintenance								
Control (<i>n</i> = 75)	62.2 ± 19.0	67.5 ± 17.2	66.9 ± 10.3	66.7 ± 10.8	0.15	19.56***	3.15*	NS
Experimental (<i>n</i> = 56)	57.2 ± 18.2	65.7 ± 15.0	68.6 ± 12.9	68.3 ± 12.5				T1 > T0*, T2 > T0***, T2 > T1*, T3 > T0***, T3 > T1*
Self-care management								
Control (<i>n</i> = 75)	54.8 ± 15.9	62.9 ± 11.7	65.7 ± 11.2	65.5 ± 12.2	3.87*	74.76***	5.54**	NS
Experimental (<i>n</i> = 56)	52.6 ± 21.1	67.7 ± 14.1	70.7 ± 12.2*	72.5 ± 11.3***				T1 > T0*, T2 > T0**, T3 > T0**, T3 > T1***
Self-care confidence								
Control (<i>n</i> = 75)	63.4 ± 15.9	67.8 ± 14.5	69.9 ± 14.4	70.5 ± 13.7	2.17	44.38***	7.41***	T2 > T1*, T3 > T0*, T3 > T1*
Experimental (<i>n</i> = 56)	58.5 ± 19.5	64.9 ± 15.0	71.9 ± 14.6*	73.7 ± 14.6				T1 > T0*, T2 > T0**, T2 > T1**, T3 > T0**, T3 > T1**

Data are presented as mean ± SD.
* $p < 0.05$, ** $p < 0.01$, *** $p < 0.001$, comparison of the difference between the control group and the experimental group.
NS = not significant; T0 = measured before education; T1 = 1 week after hospital discharge; T2 = 1 month after hospital discharge; T3 = 3 months after hospital discharge.

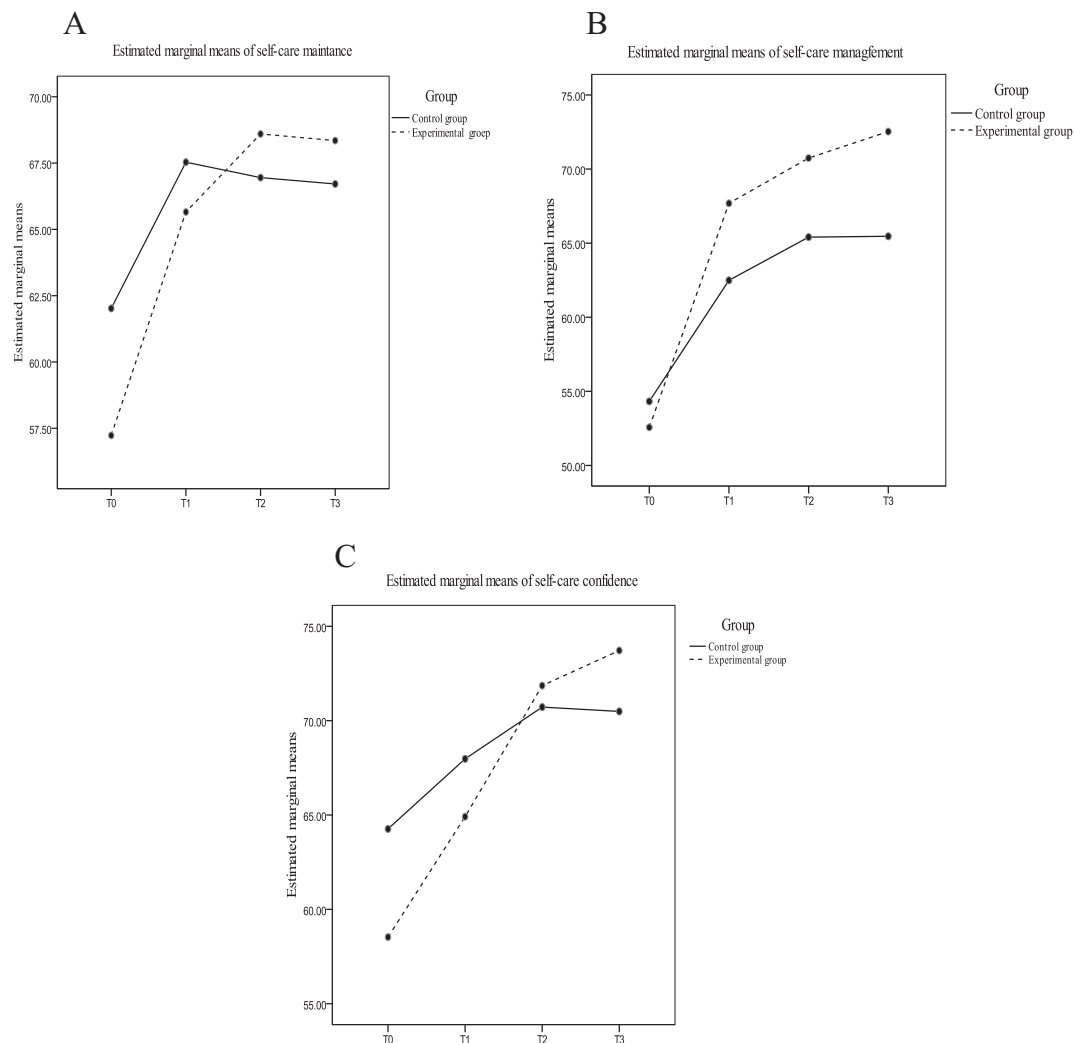


Fig. 1. Comparison of (A) self-care maintenance; (B) self-care management; and (C) self-care confidence before education (T0), 1 week after hospital discharge (T1), 1 month after hospital discharge (T2), and 3 months after hospital discharge (T3) between the control and experimental groups.

Table 4
General linear model of repeat measure of self-care management.

	T0	T1	T2	T3	Between F	Within F	Interaction (variable × group)	Post comparison
Symptom recognition								
Control (<i>n</i> = 75)	7.5 ± 5.5	10.4 ± 4.5	11.8 ± 3.8	12.5 ± 3.5	1.81	67.43***	0.65	T2 > T1*, T3 > T1*
Experimental (<i>n</i> = 56)	7.5 ± 6.6	11.5 ± 4.4	12.8 ± 3.1	13.5 ± 3.1				T2 > T0*, T2 > T1*, T3 > T0**, T3 > T1**
Treatment implementation								
Control (<i>n</i> = 75)	37.4 ± 10.1	40.2 ± 7.6	41.6 ± 7.5	39.8 ± 8.7	3.35	36.51***	8.81***	NS
Experimental (<i>n</i> = 56)	35.2 ± 12.0	42.8 ± 8.7	44.5 ± 8.2*	45.1 ± 7.8***				T1 > T0*, T2 > T0**, T3 > T0**
Treatment evaluation								
Control (<i>n</i> = 75)	9.8 ± 5.1	9.4 ± 1.7	12.3 ± 3.6	13.1 ± 3.1	1.59	53.20***	0.78	T2 > T0*, T2 > T1**, T3 > T1***
Experimental (<i>n</i> = 56)	9.8 ± 5.8	9.6 ± 1.5	13.4 ± 3.6	13.9 ± 3.0				T2 > T0*, T3 > T0**, T3 > T1*, T3 > T2*

Data are presented as mean ± SD.

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$, comparison of the difference between the control group and the experimental group.

NS = not significant; T0 = measured before education; T1 = 1 week after hospital discharge; T2 = 1 month after hospital discharge; T3 = 3 months after hospital discharge.

their knowledge levels regarding HF. However, this increase was higher in the experimental group. The results showed that targeted education of the experimental group with a teaching booklet and video-tape was effective in increasing knowledge levels.

Self-care is defined as adherence to medication and recommended lifestyle advice (self-care maintenance), as well as recognizing, monitoring, and responding to symptoms (self-care management).^{5,13} CHF is a common chronic disease that requires a significant amount of self-care. Many studies have demonstrated the effectiveness of self-care interventions by improving HF patient's self-care maintenance and management behaviours.^{8,9,13} Self-care at baseline was < 70, indicating that the participant's level of self-care was inadequate.^{9,13} Our experience with this study indicated that scores on the self-care maintenance subscales remained < 70 during the 3 months after hospital discharge. The mean self-care maintenance score was 68.3, which was lower than the score of 70.7 previously reported by Tung et al²⁵ from a study carried out in Taiwan. In the present study, the lowest score for self-care maintenance was related to forgetting to take medication and a low-salt diet. Patients who skipped medications or failed to undertake a low salt diet intentionally at certain times (or due to lack of skill) need to have the causes of these shortcomings investigated. Toder et al²⁶ highlighted that increasing patient knowledge and the ability to recognize and manage symptoms are essential in the treatment of HF. In the current study, the experimental group had a significantly higher mean score of self-care management during the 3 months than the control group. The subscale of self-care management, which is the mean score of symptom recognition and treatment evaluation were not different between both groups. The mean score of treatment implementation was significantly higher during the 3 months in the experimental group than that in the control group. Taken together, the present study revealed that an effective self-care program produces noticeable improvements in self-care management. Self-care is positively influenced by self-confidence in one's

abilities.¹³ However, results of the self-care confidence effect on self-care behavior are inconsistent. Several studies have revealed self-care confidence associated with better HF self-care behavior (self-care maintenance or self-care management).^{10–12} The present study showed a high level of self-care confidence and self-care management, but those high levels were not mirrored in self-care maintenance. In Taiwan, Tung and colleagues²⁵ reported a low level of self-care maintenance and management, although self-care confidence was adequate. By contrast, most educational programs suggest that knowledge and self-care confidence are predictors of self-management behaviors.^{27,28} According to this evidence, knowledge of CHF and self-care confidence are reinforcing factors of self-management behaviors. In the current study, after investigation using multiple regression analysis, knowledge of CHF did not explain the variance in self-care management. The self-care confidence can explain the self-care management behaviors with a total variance of $R^2 = 0.268$ by multiple regression. The estimated linear equation was: self-management behaviors = 42.977 ± 0.401 (self-confidence). Our findings are consistent with other studies demonstrating self-care confidence in the ability to perform self-care management.^{29,30}

Inglis et al²⁰ conducted a systematic review from the period of 2006 to 2008 for studies that evaluated structured telephone or telemonitoring programs to improve health outcomes in HF patients. The majority of studies revealed improvements in NYHA functional class and quality of life, and reduction in health care costs.²⁰ In the current study, the NYHA functional class showed a significant improvement post intervention in the experimental group when compared with those in the control group. In the United States, rates of 30-day admission vary widely across hospitals from 10% to 50%.³¹ Comprehensive discharge planning, including patient and caregiver education, collaboration with counseling nurses, and planned follow-up, may reduce 1 month unplanned readmission rates varying from 20% to 25%.^{31–33} In the present study, there was no significant difference in 30-day hospital readmission and

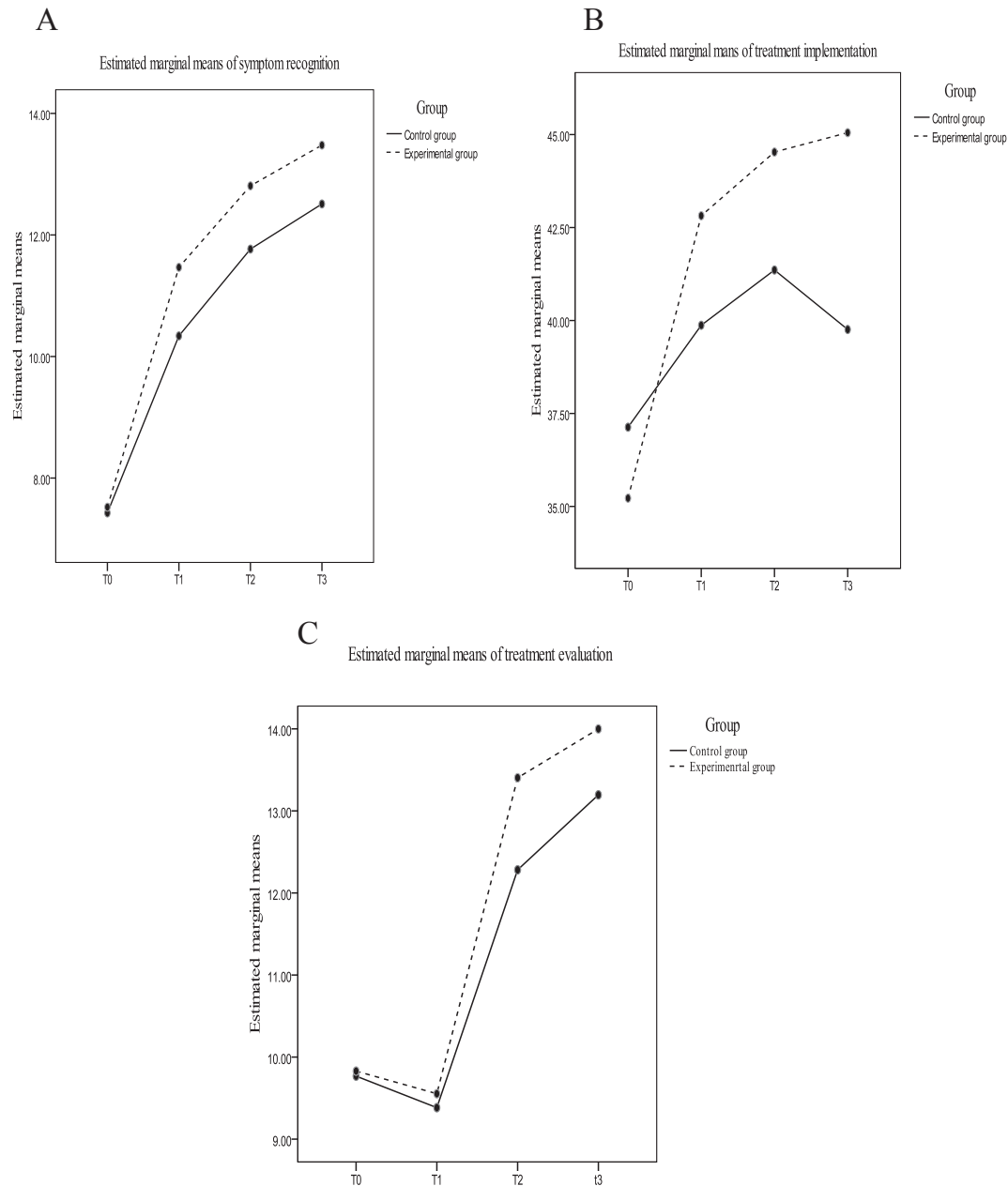


Fig. 2. Comparison of (A) symptom recognition; (B) treatment implementation; and (C) treatment evaluation before education (T0), 1 week after hospital discharge (T1), 1 month after hospital discharge (T2), and 3 months after hospital discharge (T3) between the control and experimental groups.

mortality rates between the groups. In the current study the overall 30-day hospital readmission rate was 12.2%. This result was below the national 30-day readmission rate of 25%.^{31,33} Early follow-up within 7–10 days is also vital in preventing readmissions.³⁴ In the present study, both groups received care provider telephone calls at 1 week follow-up after discharge, this may explain the similar effect on the 30-day readmission rate between the groups. In our self-care program, health care providers are not only educating patients about their disease, but further guiding them as to how to manage their illness. In the current study, the experimental group had a tendency towards a lower 3 month hospital readmission and lower mortality rate than the control group,

although there were no significant differences between the two groups. Further studies are required to determine the long term effect of the self-care program on hospital readmissions and mortality rate.

4.1. Limitations of the study

The current study had several limitations. First, because the study participants were recruited from one medical center hospital and included a high percentage of females, certain characteristics may not be representative of the general population of HF patients. Second, the convenience sampling and unblinded nature of this study may raise issues of potential

Table 5

Comparison of the New York Heart Association functional status change between the control and experimental groups.

NYHA	Control group (n = 75)				Experimental group (n = 56)			
	T0	T1	T2	T3	T0	T1	T2	T3
Class I	12 (16)	24 (32)	28 (37.3)	29 (38.7)	2 (3.6)	24 (42.9)	30 (53.6)	30 (53.6)
Class II	30 (40)	30 (40)	30 (40.0)	28 (37.3)	24 (42.9)	27 (48.2)	22 (39.3)	22 (39.3)
Class III	33 (44)	21 (28)	16 (21.3)	17 (22.7)	30 (53.5)	5 (8.9) *	4 (7.1)*	4 (7.1) *
Class IV	0	0	1 (1.3)	1 (1.3)	0	0	0	0

Data are presented as n (%).

* $p < 0.05$, comparison of the difference between the control group and the experimental group.

NYHA = New York Heart Association Classification; T0 = measured before education; T1 = 1 week after hospital discharge; T2 = 1 month after hospital discharge; T3 = 3 months after hospital discharge.

bias. Further research using equivalent control groups and a randomized control design may exclude the interference by other factors. Third, we did not examine the associations between quality of life and self-care. Determination of the quality of life post intervention may have captured a change over time. Finally, our results revealed that the self-care program had a positive impact on self-care during a 3 month time period; further research could include a longer time period in order to verify measurement of the intervention effect.

In conclusion, the current study data showed that an increased level of knowledge improved self-care and NYHA functional class results when compared with results obtained from patients who underwent usual care. In the present study a self-care program with a companion teaching booklet and video-tape that can be helpful for patients was developed. Therefore, we suggest that this educational program could be included in the routine inpatient discharge planning guidance. However, this should be supplemented by periodic phone counseling with patients to increase knowledge and engage in effective self-care after hospital discharge.

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References

- Clark AM, Freyberg N, Heath SL, Savard L, McDonald M, Strain L. The potential of nursing to reduce the burden of heart failure in rural Canada what strategies should nurses prioritize? *Can J Cardiovasc Nurs* 2008;18:40–4.
- Gau JY, Ting CT, Yeh MC, Chang TH. The effectiveness of comprehensive care program at improving self-care and quality of life and reducing rehospitalization in patients with congestive heart failure. *EBN* 2008;4:233–41.
- Willette EW, Surrells D, Davis LL, Bush CT. Nurses' knowledge of heart failure self-management. *Prog Cardiovasc Nurs* 2007;22:190–5.
- Orem D. *Nursing: concepts of practice*. 6th ed. St Louis: Mosby; 2001.
- Dickson VV, Deatrick JA, Goldberg LR, Riegel B. A mixed methods study exploring the factors that facilitate and impede heart failure self-care. *J Card Fail* 2006;12:124–5.
- Evangelists LS, Shinnick MA. What do we know about adherence and self-care? *J Cardiovasc Nurs* 2008;23:250–7.
- Leventhal MJ, Riegel B, Carlson B, De Geest S. Negotiating compliance in heart failure: Remaining issues and questions. *Eur J Cardiovasc Nurs* 2005;4:298–307.
- Barnason S, Zimmerman L, Young L. An integrative review of interventions promoting self-care of patients with heart failure. *J Clin Nurs* 2012;21:448–75.
- Riegel B, Dickson VV. A situation-specific theory of heart failure self-care. *J Cardiovasc Nurs* 2008;23:190–6.
- Cené CW, Haymore LB, Dolan-Soto D, Lin FC, Pignone M, Dewalt DA, et al. Self-care confidence mediates the relationship between perceived social support and self-care maintenance in adults with heart failure. *J Card Fail* 2013;19:202–10.
- Schnell-Hoehn KN, Naimark BJ, Tate RB. Determinants of self-care behaviors in community-dwelling patients with heart failure. *J Cardiovasc Nurs* 2009;24:40–7.
- van der Wal MHL, Jaarsma T, Moser DK, Veeger NJGM, van Gilst WH, van Veldhuisen DJ. Compliance in heart failure patients: the importance of knowledge and beliefs. *Eur Heart J* 2006;27:434–40.
- Riegel B, Lee CS, Dickson VV, Carlson B. An update on the self-care of heart failure index. *J Cardiovasc Nurs* 2009;24:485–97.
- Seto E, Leonard KJ, Cafazzo JA, Masino C, Barnsley J, Ross HJ. Self-care and quality of life of heart failure patients at a multidisciplinary heart function clinic. *J Cardiovasc Nurs* 2011;26:377–85.
- Jovicic A, Holroyd-Leduc J, Straus SE. Effects of self-management intervention on health outcomes of patients with heart failure: a systematic review of randomized controlled trials. *BMC Cardiovasc Disor* 2006;6:43.
- Shao JH, Yeh HF. The effectiveness of self-management programs for elderly people with heart failure. *Tzu Chi Nurs J* 2010;9:71–9.
- Artinian NT, Magnan M, Sloan M, Lange MP. Self-care behaviours among patients with heart failure. *Heart Lung* 2002;31:161–72.
- Duffy JR, Hoskins L, Chen MC. Nonpharmacological strategies for improving heart failure outcomes in the community: a systematic review. *J Nurs Care Qual* 2004;19:349–60.
- Tsuyuki RT, McKelvie RS, Arnold JM, Avezum Jr A, Barretto AC, Carvalho AC, et al. Acute precipitants of congestive heart failure exacerbations. *Arch Intern Med* 2001;161:2337–42.
- Inglis SC, Clark RA, McAlister FA, Ball J, Lewinter C, Cullington D, et al. Structured telephone support or telemonitoring programmes for patients with chronic heart failure. *Cochrane Database Syst Rev* 2010;8:CD007228.
- DeWalt DA, Pignone M, Malone R, Rawls C, Kosnar MC, George G, et al. Development and pilot testing of a disease management program for low literacy patients with heart failure. *Patient Educ Couns* 2004;55:78–86.
- Jessup M, Casey DE, Francis GS, Mancin DM, Stevenson LY. 2009 Focused update incorporated into the ACC/AHA 2005 guideline for the

- diagnosis and management of heart failure in adults. *Circulation* 2009;**119**:e391–479.
23. Grady KL, Dracup K, Kennedy G, Moser DK, Piano M, Stevenson LW, et al. Team management of patients with heart failure. A statement for healthcare professional from the cardiovascular nursing council of the American Heart Association. *Circulation* 2000;**102**:2443–56.
 24. Stanley M. Current trends in the clinical management of an old enemy: Congestive heart failure in the elderly. *AACN Clinical Issues* 1997;**8**:616–26.
 25. Tung HH, Lin CY, Chen KY, Chang CJ, Lin YP, Chou CH. Self-management intervention to improve self-care and quality of life in heart failure patients. *Congest Heart Fail* 2013;**19**:E9–16.
 26. Todera CM, La Framboise LM, Zimmerman LM. Symptom status and quality-of-life outcomes of home-based disease management program for heart failure patients. *Outcomes Manag* 2002;**6**:161–8.
 27. Subramanian U, Hopp F, Mitchinson A, Lowery J. Impact of provider self-management education, patient self-efficacy, and health status on patient adherence in heart failure in a veterans administration population. *Congest Heart Fail* 2008;**14**:6–11.
 28. Baptiste DL, Mark H, Groff-Paris L, Taylor LA. A nurse-guided patient-centered heart failure education program. *J Nurs Educ* 2014;**4**:49–57.
 29. Buck HG, Lee CS, Moser DK, Albert NM, Lennie T, Bentley B, et al. Relationship between self-care and health related quality of life in older adults with moderate to advanced heart failure. *J Cardiovasc Nurs* 2012;**27**:8–15.
 30. Hannah K, Holly M. The role of self-efficacy in cardiovascular disease self-management: a review of effective programs. *Patient Intelligence* 2010;**2**:33–44.
 31. Joynt KE, Jha AK. Who has higher readmission rates for heart failure, and why? Implications for efforts to improve care using financial incentives. *Circ Cardiovasc Qual Outcomes* 2011;**4**:53–9.
 32. Jencks SF, Williams MV, Coleman EA. Rehospitalizations among patients in the Medicare fee-for-services program. *N Engl J Med* 2009;**360**:1418–28.
 33. Joseph S, Ross JS, Chen J, Lin Z, Bueno H, Curtis JP, et al. Recent national trends in readmission rates after heart failure hospitalization. *Circ Heart Fail* 2010;**3**:97–103.
 34. Hernandez AF, Greiner MA, Fonarow GC, Hammill BG, Heidenreich PA, Yancy CW, et al. Relationship between early physician follow-up and 30-day readmission among Medicare beneficiaries hospitalized for heart failure. *JAMA* 2010;**303**:1716–22.